

Ifw/2186

PATENT

DOCKET NO.: 2207/9865

Assignee: Intel Corporation



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS : Manoj Khare et al.
SERIAL NO. : 09/749,660
FILED : December 28, 2000

FOR : METHOD AND APPARATUS FOR REDUCING MEMORY
LATENCY IN A CACHE COHERENT MULTI-NODE
ARCHITECTURE

GROUP ART UNIT : 2186

EXAMINER : Tuan V. Thai

ASSIGNEE : INTEL CORPORATION

REQUEST FOR RESCINDMENT OF NOTICE OF ABANDONMENT

Mail Stop - Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

Applicants received the attached Notice of Abandonment mailed on June 30, 2005 concerning this application, which indicates that no reply was received to an Office Letter mailed on "02/012005." It is believed that this refers to an Advisory Action mailed on February 1, 2005. Applicants filed a Notice of Appeal on December 3, 2004. The final due date for filing an appeal brief or other action by the Applicant was July 3, 2005 (which was a Sunday, making July 5, 2005 the next business day). On July 5, 2005 Applicant filed an RCE and a Preliminary Amendment. Copies of the Notice of Appeal, RCE, Preliminary Amendment and corresponding post cards indicating that these documents were received by the PTO are enclosed.

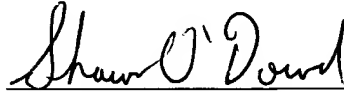
Accordingly, Applicants respectfully request rescindment of the Notice of Abandonment.

PATENT
DOCKET NO.: 2207/9865
Assignee: Intel Corporation

The undersigned placed a call to Examiner Thai on July 12, 2005 and left a voice-mail explaining the above set of facts. That call has not yet been returned.

Respectfully submitted,

Dated: July 14, 2005

A handwritten signature in dark ink, appearing to read "Shawn W. O'Dowd", is written over a horizontal line.

Shawn W. O'Dowd
Registration No. 34,687

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1500 K Street, N.W. - Suite 700
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UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/749,660	12/28/2000	Manoj Khare	2207/9865	8718
23838	7590	06/30/2005	EXAMINER	
KENYON & KENYON 1500 K STREET NW SUITE 700 WASHINGTON, DC 20005			THAI, TUAN V	
			ART UNIT	PAPER NUMBER
			2186	

DATE MAILED: 06/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Notice of Abandonment

Application No.

09/749,660

Examiner

Tuan V. Thai

Applicant(s)

KHARE ET AL.

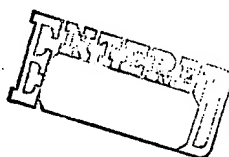
Art Unit

2186

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on 02/012005.
 - (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
 - (b) ☐ A proposed reply was received on _____, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection.
(A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
 - (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
 - (d) ☒ No reply has been received.
2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
 - (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
 - (b) ☐ The submitted fee of \$_____ is insufficient. A balance of \$_____ is due.
The issue fee required by 37 CFR 1.18 is \$_____. The publication fee, if required by 37 CFR 1.18(d), is \$_____.
 - (c) ☐ The issue fee and publication fee, if applicable, has not been received.
3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
 - (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
 - (b) ☐ No corrected drawings have been received.
4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.
5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.
6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.
7. ☐ The reason(s) below:




TUAN V. THAI
PRIMARY EXAMINER

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

The stamp of the Patent Office hereon may be taken as acknowledging the receipt, on the date stamped, of:

INVENTOR(S):

Manoj Khare, et al.

SERIAL NO.:

09/749,660

FILED:

December 28, 2000

TITLE:

METHOD AND APPARATUS FOR REDUCING MEMORY
LATENCY IN A CACHE MULTI-NODE

GROUP ART:

2186

EXAMINER:

TUAN V. THAI

PAPERS FILED:

1. Request for Continued Examination (2 copies)
2. Request of Three Month Extension of Time (a copy)
3. Preliminary Amendment (9 pages)



SWO/cnw

July 5, 2005

2207/9865

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional)
2207/9865

In re Application of Manoj Khare, et al.

Application Number 09/749,660

Filed Dec. 28, 2000

For METHOD AND APPARATUS FOR REDUCING MEMORY
LATENCY IN A CACHE COHERENT MULTI-NODE ARCHITECTURE

Art Unit 2186

Examiner Tuan V. Thai

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and appropriate non-small-entity fee are as follows (check time period desired):

- ☐ One month (37 CFR 1.17(a)(1)) \$ _____
- ☐ Two months (37 CFR 1.17(a)(2)) \$ _____
- ☐ Three months (37 CFR 1.17(a)(3)) \$ _____
- ☐ Four months (37 CFR 1.17(a)(4)) \$ _____
- ☒ Five months (37 CFR 1.17(a)(5)) \$ 2,160.00

- ☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____.
- ☐ A check in the amount of the fee is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 11-0600.
I have enclosed a duplicate copy of this sheet.

I am the ☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 34,687

☒ attorney or agent under 37 CFR 1.34(a).

Registration number if acting under 37 CFR 1.34(a). 34,687.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

July 5, 2005

Date

202.220.4255

Telephone Number

Shawn W. O'Dowd

Signature

Shawn W. O'Dowd

Typed or printed name

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. 502195_1.DOC

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

**Request
For
Continued Examination (RCE)
Transmittal**

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	09/749,660
Filing Date	December 28, 2000
First Named Inventor	Manoj Khare, et al.
Art Unit	2186
Examiner Name	Tuan V. Thai
Attorney Docket Number	2207/9865

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **Submission required under 37 C.F.R. 1.114** Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

- a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.
- i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ii. ☐ Other _____
- b. ☒ Enclosed
- i. ☒ Amendment/Reply
- ii. ☐ Affidavit(s)/Declaration(s)
- iii. ☐ Information Disclosure Statement (IDS)
- iv. ☐ Other _____

2. **Miscellaneous**

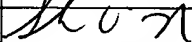
- a. ☐ Suspension of action on the above-identified application is requested under 37 C.F.R. 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 C.F.R. 1.17(i) required)
- b. ☐ Other _____

3. **Fees** The RCE fee under 37 C.F.R. 1.17(e) is required by 37 C.F.R. 1.114 when the RCE is filed.

- a. ☒ The Director is hereby authorized to charge the following fees, or credit any overpayments, to Deposit Account No. 11-0600
- i. ☒ RCE fee required under 37 C.F.R. 1.17(e)
- ii. ☒ Extension of time fee (37 C.F.R. 1.136 and 1.17)
- iii. ☐ Other _____
- b. ☐ Check in the amount of \$ _____ enclosed
- c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Name (Print /Type)	Shawn W. O'Dowd	Registration No. (Attorney/Agent)	34,687
Signature		Date	July 5, 2005

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below:

Name (Print /Type)			
Signature		Date	

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PATENT
DOCKET NO.: 2207/9865
Assignee: Intel Corporation

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS : Manoj Khare et al.
SERIAL NO. : 09/749,660
FILED : December 28, 2000
FOR : METHOD AND APPARATUS FOR REDUCING
MEMORY LATENCY IN A CACHE COHERENT
MULTI-NODE ARCHITECTURE
GROUP ART UNIT : 2186
EXAMINER : Tuan V. Thai
ASSIGNEE : INTEL CORPORATION

HON. COMMISSIONER
FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

S I R:

Please enter the following amendment prior to examination of the present
application

IN THE CLAIMS:

Please amend the claims as follows (all claims listed):

1. (Currently Amended) A method for reducing memory latency in a multi-node architecture, comprising:

issuing a memory read request from a requesting node;
issuing a speculative memory read request from a coherence agent in response to
said memory read request from the requesting node;

receiving a the speculative memory read request at a home node before results of a cache coherence protocol are determined; and

initiating a read to memory to complete the speculative memory read request before results of the cache coherence protocol are determined.

2. (Currently Amended) The method of claim [[2]] 1, further comprising:

buffering results of the read to memory.

3. (Original) The method of claim 2, further comprising:

dropping the results of the read to memory on a buffer full condition or if a cancel command is received.

4. (Original) The method of claim 3, further comprising:

if a confirm command is received after results of the read to memory are dropped,
initiating a second read to memory to complete a memory read request.

5. (Original) The method of claim 4, further comprising:

forwarding results of the second read to memory to a requester.

6. (Original) The method of claim 3, further comprising:

if a confirm command is received before results of the speculative read are
dropped, forwarding the results of the read to memory to a requester.

7. (Canceled)

8. (Original) The method of claim 6, further comprising:

receiving the results of the read to memory at the coherence agent; and
forwarding the results of the read to memory to the requesting node.

9. (Currently Amended) A method for reducing memory latency, comprising:

issuing a memory read request by a requesting node;

issuing a speculative memory read request from a coherence agent to a home node
in response to said memory read request from the requesting node before results of a
cache coherence protocol are determined;

initiating a read to memory at said home node; and

initiating the cache coherence protocol after initiating the read to memory at said home node.

10. (Original) The method of claim 9, further comprising:

updating a memory status relating to the results in a table after the results of the cache coherence protocol are determined.

11. (Original) The method of claim 9, wherein initiating the cache coherence protocol comprising:

initiating a status look-up to determine the caching status of the requested memory.

12. (Original) The method of claim 11, further comprising:

issuing a confirm command to the home node if the caching status is determined to be in an invalid state or shared state,

13. (Original) The method of claim 11, further comprising:

snooping a node with the exclusive copy of the requested memory cached.

14. (Original) The method of claim 13, further comprising :

determining whether the exclusive copy of the requested memory is clean or dirty.

15. (Original) The method of claim 14, further comprising:

issuing a confirm command to the home node if the exclusive copy of the requested memory is clean.

16. (Original) The method of claim 14, further comprising:

issuing a cancel command to the home node if the exclusive copy of the requested memory is dirty.

17. (Original) The method of claim 13, further comprising:

receiving a snoop result, wherein the snoop result includes a copy of the requested memory; and

updating a memory status relating to the requested memory in a table.

18. (Original) The method of claim 17, further comprising:

receiving the requested memory; and

forwarding the requested memory to a requesting node.

19. (Currently Amended) A home node to respond to read requests in a multi-node architecture including a plurality of nodes, the home node comprising:

a processor;

a memory; and

a node controller coupled to the processor and memory, the node controller to:

receive a speculative memory read request from a requester coherency agent in the multi-node architecture before a cache coherence protocol is resolved, and

initiate a read to memory to complete the speculative memory read request before the cache coherence protocol is resolved.

20. (Original) The home node of claim 19 further comprising:

a buffer adapted to buffer the results of the read to memory.

21. (Original) The home node of claim 20, wherein the results of the read from memory are dropped from the buffer on a buffer full condition or upon receiving a cancel command.

22. (Original) The home node of claim 20, wherein the node controller responsive to a confirm is adapted to forward the results of the read to memory to the requester.

23. (Original) The home node of claim 20, wherein the node controller responsive to a cancel command is adapted to drop the data specified by the speculative read command.

24. (Currently Amended) A system comprising:

a node including a node controller to control a plurality of processors resident in the node, wherein the node controller is to receive a speculative read request from a coherence agent before results of a coherence protocol are determined and the node controller is to read data specified by the speculative read command from memory before the results of the coherence protocol are determined; and

[[a]] the coherence agent coupled to the at least one node, the coherence agent including a coherence controller adapted to determine the results of the coherence protocol and adapted to forward a cancel command or a confirm command to the node after the results of the coherence protocol are determined.

25. (Original) The system of claim 24, wherein the node controller responsive to the confirm command issued by the coherence controller is adapted to send the data read from memory to the coherence controller.

26. (Original) The system of claim 24, wherein the node controller responsive to the cancel command issued by the coherence controller is adapted to drop the data read from memory.

27. (Original) The system of claim 24, further comprising:

a requesting node adapted to send a data read request to request data identified by a memory address included in the data read request.

28. (Canceled)

29. (Original) The system of claim 24, wherein the speculative read request is sent by the switching agent.

REMARKS

Claims 1-29 remain in this application. Claims 1, 2, 9, 19 and 24 have been amended. Claims 7 and 28 have been canceled without prejudice. Applicant respectfully requests that the above-identified application be reconsidered in view of the amendments above.

Previous Rejections

It is assumed that claims 1-29 have been previously rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,275,907 to Baumgartner et al. ("Baumgartner") in view of U.S. Patent No. 5,895,484 to Arimilli. At this time, the claims have been amended to focus on one of the embodiments of the specification: the use of a coherence agent to issue a speculative read request that can be processed prior to the results of a coherency protocol are determined. Such a feature is described, for example, at pages 11-13 of the present application.

Such a feature is not described or suggested by the cited references. Baumgartner fails to teach a coherency agent and, as admitted in previous office actions, completing the memory read request before results of the cache coherence protocol are determined. Arimilli also fails to show this feature. In Arimilli, a read request is snooped from the bus by all processing units coupled to the bus. Each processing unit prepares a coherency response for the snooped request. The processing unit that issues an intervention coherency response, then proceeds to buffer data for the read request. Thus, Arimilli also fails to teach or suggest the coherency agent of the claims to issue the speculative read request.

CONCLUSION

For all the above reasons, the Applicant respectfully submit that this application is now in condition for allowance. A Notice of Allowance is earnestly solicited.

The Examiner is invited to contact the undersigned at (202) 220-4255 to discuss any matter concerning this application. The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. § 1.16 or § 1.17 to Deposit Account No. 11-0600.

Respectfully submitted,
KENYON & KENYON

Dated: July 5, 2005

By:



Shawn W. O'Dowd
Reg. No. 34,687

KENYON & KENYON
1500 K Street, NW
Suite 700
Washington, DC 20005
(202) 220-4200 telephone
(202) 220-4201 facsimile
DC1-510950

The datestamp of the U.S. Patent and Trademark Office hereon will acknowledge receipt of the following item(s):

Docket No.	2207/9865	Serial No.	09/749,660	Today's Date	Dec. 3, 2004
By	SWO/DCO/CW	Filing Date	Dec. 28, 2000	Express Mail No.	N/A

Inventors/
Applicant

Manoj Khare, et al.

Title

METHOD AND APPARATUS FOR REDUCING MEMORY LATENCY IN A
CACHE COHERENT MULTI-NODE ARCHITECTURE

Item No.

Description

1. Amendment
2. Notice of Appeal (a copy)
3. Petition for Extension of Time (a copy)
- 4.
- 5.

No. of
Pages

11
1
1



PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional)
2207/9865

In re Application of Manoj Khare, et al.

Application Number 09/749,660

Filed Dec. 28, 2000

For METHOD AND APPARATUS FOR REDUCING MEMORY
LATENCY IN A CACHE COHERENT MULTI-NODE ARCHITECTURE

Art Unit 2186

Examiner Tuan V. Thai

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

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- ☒ Three months (37 CFR 1.17(a)(3)) \$ 980.00
- ☐ Four months (37 CFR 1.17(a)(4)) \$ _____
- ☐ Five months (37 CFR 1.17(a)(5)) \$ _____

- ☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee amount shown above is reduced by one-half, and the resulting fee is: \$ _____.
- ☐ A check in the amount of the fee is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
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- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 11-0600.
- I have enclosed a duplicate copy of this sheet.

I am the ☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☒ attorney or agent of record. Registration Number 34,687

☒ attorney or agent under 37 CFR 1.34(a).

Registration number if acting under 37 CFR 1.34(a). 34,687.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

December 3, 2004

Date

202.220.4255

Telephone Number

Shawn W. O'Dowd

Signature

Shawn W. O'Dowd

Typed or printed name

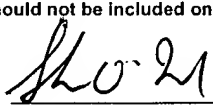
NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. 502195_1.DOC

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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

NOTICE OF APPEAL FROM THE EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES		Docket Number (Optional) 2207/9865					
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on _____. Signature _____ Typed or printed name _____		In re Application of Manoj Khare, et al. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">Application Number 09/749,660</td> <td style="width: 50%; padding: 2px;">Filed December 28, 2000</td> </tr> </table> For METHOD AND APPARATUS FOR REDUCING MEMORY LATENCY IN A CACHE COHERENT MULTI-NODE ARCHITECTURE <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">Art Unit 2186</td> <td style="width: 50%; padding: 2px;">Examiner Tuan V. Thai</td> </tr> </table>		Application Number 09/749,660	Filed December 28, 2000	Art Unit 2186	Examiner Tuan V. Thai
Application Number 09/749,660	Filed December 28, 2000						
Art Unit 2186	Examiner Tuan V. Thai						
Applicant hereby appeals to the Board of Patent Appeals and Interferences from the decision of the examiner. The fee for this Notice of Appeal is (37 CFR 1.17(b)) \$ <u>340.00</u>. <div style="display: flex; justify-content: space-between;"> <div style="width: 80%;"> <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is: <input type="checkbox"/> A check in the amount of the fee is enclosed. <input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached. <input type="checkbox"/> The Director has already been authorized to charge fees in this application to a Deposit Account. I have enclosed a duplicate copy of this sheet. <input checked="" type="checkbox"/> The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. <u>11-0600</u>. I have enclosed a duplicate copy of this sheet. <input checked="" type="checkbox"/> A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed. </div> <div style="width: 15%; text-align: right;">\$ _____</div> </div> WARNING: Information on this form may become public. Credit card information should not be included on this Form. Provide credit card information and authorization on PTO-2038. <div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> I am the <input type="checkbox"/> applicant/inventor. <input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96) <input checked="" type="checkbox"/> attorney or agent of record. Registration number <u>34,687</u> <input type="checkbox"/> attorney or agent acting under 37 CFR 1.34(a). Registration number if acting under 37 CFR 1.34(a) _____. </div> <div style="width: 35%; text-align: center;">  _____ Signature Shawn W. O'Dowd _____ Typed or printed name (202) 220-4255 _____ Telephone number _____ December 3, 2004 _____ Date </div> </div> NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.							

☐ *Total of ___ forms are submitted.

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PATENT
DOCKET NO.: 2207/9865
Assignee: Intel Corporation

Response Under 37 C.F.R. § 1.116
Expedited Procedure
Examining Group 2186

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS : Manoj Khare et al.
SERIAL NO. : 09/749,660
FILED : December 28, 2000
FOR : METHOD AND APPARATUS FOR REDUCING
MEMORY LATENCY IN A CACHE COHERENT
MULTI-NODE ARCHITECTURE
GROUP ART UNIT : 2186
EXAMINER : Tuan V. Thai
ASSIGNEE : INTEL CORPORATION

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AMENDMENT

S I R:

The following amendments and remarks below are respectfully submitted in
response to the Office Action dated June 3, 2004.

IN THE CLAIMS:

Please amend the claims as follows (all claims listed):

1. (Previously Presented) A method for reducing memory latency in a multi-node architecture, comprising:
 - receiving a speculative memory read request at a home node before results of a cache coherence protocol are determined; and
 - initiating a read to memory to complete the speculative memory read request before results of the cache coherence protocol are determined.
2. (Currently Amended) The method of claim [[2]] 1, further comprising:
 - buffering results of the read to memory.
3. (Original) The method of claim 2, further comprising:
 - dropping the results of the read to memory on a buffer full condition or if a cancel command is received.
4. (Original) The method of claim 3, further comprising:
 - if a confirm command is received after results of the read to memory are dropped, initiating a second read to memory to complete a memory read request.

5. (Original) The method of claim 4, further comprising:

forwarding results of the second read to memory to a requester.

6. (Original) The method of claim 3, further comprising:

if a confirm command is received before results of the speculative read are dropped, forwarding the results of the read to memory to a requester.

7. (Original) The method of claim 6, wherein the speculative memory read request is issued by the requesting node.

8. (Original) The method of claim 6, further comprising:

receiving the results of the read to memory at the coherence agent; and
forwarding the results of the read to memory to the requesting node.

9. (Previously Presented) A method for reducing memory latency, comprising:

issuing a speculative memory read request to a home node before results of a cache coherence protocol are determined;

initiating a read to memory at said home node; and

initiating the cache coherence protocol after initiating the read to memory at said home node.

10. (Original) The method of claim 9, further comprising:

updating a memory status relating to the results in a table after the results of the cache coherence protocol are determined.

11. (Original) The method of claim 9, wherein initiating the cache coherence protocol comprising:

initiating a status look-up to determine the caching status of the requested memory.

12. (Original) The method of claim 11, further comprising:

issuing a confirm command to the home node if the caching status is determined to be in an invalid state or shared state.

13. (Original) The method of claim 11, further comprising:

snooping a node with the exclusive copy of the requested memory cached.

14. (Original) The method of claim 13, further comprising :

determining whether the exclusive copy of the requested memory is clean or dirty.

15. (Original) The method of claim 14, further comprising:

issuing a confirm command to the home node if the exclusive copy of the requested memory is clean.

16. (Original) The method of claim 14, further comprising:

issuing a cancel command to the home node if the exclusive copy of the requested memory is dirty.

17. (Original) The method of claim 13, further comprising:

receiving a snoop result, wherein the snoop result includes a copy of the requested memory; and

updating a memory status relating to the requested memory in a table.

18. (Original) The method of claim 17, further comprising:

receiving the requested memory; and

forwarding the requested memory to a requesting node.

19. (Previously Presented) A home node to respond to read requests in a multi-node architecture including a plurality of nodes, the home node comprising:

a processor;

a memory; and

a node controller coupled to the processor and memory, the node controller adapted to:

receive a speculative memory read request from a requester in the multi-node architecture before a cache coherence protocol is resolved, and

initiate a read to memory to complete the speculative memory read request before the cache coherence protocol is resolved.

20. (Original) The home node of claim 19 further comprising:

a buffer adapted to buffer the results of the read to memory.

21. (Original) The home node of claim 20, wherein the results of the read from memory are dropped from the buffer on a buffer full condition or upon receiving a cancel command.

22. (Original) The home node of claim 20, wherein the node controller responsive to a confirm is adapted to forward the results of the read to memory to the requester.

23. (Original) The home node of claim 20, wherein the node controller responsive to a cancel command is adapted to drop the data specified by the speculative read command.

24. (Previously Presented) A system comprising:

a node including a node controller to control a plurality of processors resident in the node, wherein the node controller is to receive a speculative read request before results of a coherence protocol are determined and the node controller is to read data specified by the speculative read command from memory before the results of the coherence protocol are determined; and

a coherence agent coupled to the at least one node, the coherence agent including a coherence controller adapted to determine the results of the coherence protocol and

adapted to forward a cancel command or a confirm command to the node after the results of the coherence protocol are determined.

25. (Original) The system of claim 24, wherein the node controller responsive to the confirm command issued by the coherence controller is adapted to send the data read from memory to the coherence controller.

26. (Original) The system of claim 24, wherein the node controller responsive to the cancel command issued by the coherence controller is adapted to drop the data read from memory.

27. (Original) The system of claim 24, further comprising:

a requesting node adapted to send a data read request to request data identified by a memory address included in the data read request.

28. (Original) The system of claim 27, wherein the speculative read request is sent by the requesting node.

29. (Original) The system of claim 24, wherein the speculative read request is sent by the switching agent.

REMARKS

Claims 1-29 remain in this application. Claim 2 has been amended. Applicant respectfully requests that the above-identified application be reconsidered in view of the following remarks.

Title

The current Office Action objects to the title of the invention as not being descriptive. Applicants respectfully disagree, the title is quite detailed and resembles the language of the preamble of claim 1, for example. In accordance with MPEP, and because of the detail already provided in the title, Applicants respectfully request a suggestion of a new title for the present application.

The 35 U.S.C. § 103(a) Rejection

Claims 1-6, 12-13, 15-17, 19-25, 31-32, 34, 36, 47-51 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,275,907 to Baumgartner et al. ("Baumgartner") in view of U.S. Patent No. 5,895,484 to Arimilli. At the outset, there are 29 claims pending in the present case. Furthermore, the Office Action discusses claims 7-11, 14, 18, and 26-29 in the text of the rejection. Accordingly, it is assumed that the Examiner intended to reject claims 1-29 under 35 U.S.C. § 103(a) in view of these two references.

It is noted that the Examiner states that Applicants' Amendment of April 6, 2004 has been carefully considered, but there is absolutely no discussion in the current Office Action as to the arguments made therein.

According to an embodiment of the present invention, before the coherence protocol results are determined or completed, a requesting node or a coherence agent on behalf of the requesting node may issue a speculative memory read request to a home node of the requested memory location. The home node having the requested location may be defined as the node whose main memory stores the data for memory location (address) to be read. The home node that receives the speculative read request may access a memory address space to retrieve data specified by the speculative read request. While the home node of the memory location processes the speculative read request, the coherence agent determines the results of a cache coherence protocol. Based on these results, the coherence agent may send a cancel or confirm command to the home node. The cancel command causes the home node to drop the retrieved data, while the confirm command causes the home node to return the accessed data to the requesting agent.

Claim 1, for example, recites receiving a speculative memory read request at a home node before results of a cache coherence protocol are determined, and initiating a read to memory to complete the speculative memory read request before results of the cache coherence protocol are determined.

The Office Action concedes that Baumgartner fails to teach completing the memory read request before results of the cache coherence protocol are determined. Arimilli fails to make up for these deficiencies.

Arimilli refers to a method and system for speculatively accessing cache memory data. Referring to Fig. 3, and Col. 4, line 60 et seq. a method is described for accessing caches in a multi-processor environment. In block 31, a read or RWITM (read with intent to modify) request is snooped from the system bus by each processor. In block 32,

each processor determines whether the requested data is in its L2 cache. If the data is not in its L2 cache, a null response is issued. If the data is in its L2 cache, an intervention coherency response is issued by the processing unit (see Col. 5, lines 6-9). Examples of intervention coherency responses are given at Col. 4, lines 6-24, and includes a modified intervention coherency response and a shared intervention coherency response. This can be compared to the Background section of the Applicants' specification, in particular page 2, lines 1-7 describing a similar cache snooping technique. Accordingly, as recited in the specification of Arimilli, a cache coherency protocol is performed before initiating a read to memory to complete the speculative memory read request as recited in claim 1, independent claims 9, 19, and 24 include similar limitations.

Since features of the pending claims are not found in the Baumgartner or Arimilli references, taken individually or in combination, reconsideration and withdrawal of the rejection of claims 1-29 under 35 U.S.C. § 103(a) is respectfully requested.

CONCLUSION

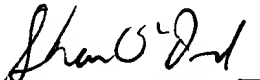
For all the above reasons, the Applicant respectfully submit that this application is now in condition for allowance. A Notice of Allowance is earnestly solicited.

The Examiner is invited to contact the undersigned at (202) 220-4255 to discuss any matter concerning this application. The Office is hereby authorized to charge any additional fees or credit any overpayments under 37 C.F.R. § 1.16 or § 1.17 to Deposit Account No. 11-0600.

Respectfully submitted,
KENYON & KENYON

Dated: December 3, 2004

By:



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